



## DECLARATION

I, NOBUAKI KATO, a Japanese Patent Attorney registered No. 8517, of Okabe International Patent Office at No. 602, Fuji Bldg., 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo, Japan, hereby declare that I have a thorough knowledge of Japanese and English languages, and that the attached pages contain a correct translation into English of the priority documents of Japanese Patent Application No. 11-104544 filed on April 12, 1999 in the name of CANON KABUSHIKI KAISHA.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made, are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this 31<sup>st</sup> day of May, 2005

  
NOBUAKI KATO

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of the following application as filed with this office.

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Applicant(s): CANON KABUSHIKI KAISHA

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[Name of the Document]	Specification
[Title of the Invention]	Image Processing Apparatus, Method thereof, And Recording Medium

[What is Claimed is]

[Claim 1]

An image processing apparatus for writing a given image into recording means and reproducing and outputting said recorded image by means of display means, and capable of writing data other than said image in said recording means, comprising:

judging means for judging, during writing the image or the data other than the image into the recording means, if a power supply capacity of a power source becomes less than a predetermined first capacity; and

control means for reducing the electric power to be supplied to said display means when a judging result is affirmative.

[Claim 2]

An image processing apparatus according to claim 1, wherein a second capacity larger than the first capacity is predetermined, said judging means judges if the power supply capacity of said power source becomes less than said second capacity, and a warning is produced when a judging result is affirmative.

[Claim 3]

An image processing apparatus according to claim 2, wherein said warning means is display means different from said display means for displaying the image.

[Claim 4]

An image processing apparatus according to any one of claims 1 to 3, wherein said control means stops power supply to the entire apparatus upon completion of writing into said recording means in case that a judging result of said judging means in relation to the first capacity is affirmative.

[Claim 5]

An image processing apparatus according to any one of claims 1 to 4, wherein the power source is a battery.

[Claim 6]

An image processing apparatus according to any one of claims 1 to 5, wherein said recording means is a portable recording medium detachable from the apparatus main body.

[Claim 7]

An image processing method of writing a given image into recording means and reproducing and outputting said recorded image by means of display means, and capable of writing data other than said image in said recording means, comprising:

a judging step of judging, during writing the image or the data other than the image into the recording means, if a power supply capacity of a power source becomes less than a predetermined first capacity; and

a control step of reducing the electric power to be supplied to said display means when a judging result is affirmative.

[Claim 8]

An image processing method according to claim 7, further comprising a warning judging step of predetermining a second capacity larger than the first capacity, and of judging if the power supply capacity of said power source becomes less than said second capacity, wherein said warning judging step produces a warning when a judging result thereof is affirmative.

[Claim 9]

An image processing method according to claim 8, wherein said warning judging step effects the warning onto display means different from said display means for displaying the image.

[Claim 10]

An image processing method according to any one of claims 7 to 9, further comprising a power supply stopping step of stopping power supply to the entire apparatus upon completion of writing into said recording means when a judging result of said judging means in relation to the first capacity is affirmative.

[Claim 11]

An image processing method according to any one of claims 7 to 10, wherein the power source is a battery.

[Claim 12]



An image processing method according to any one of claims 7 to 11, wherein said recording means is a portable recording medium detachable from the apparatus main body.

[Claim 13]

A recording medium recording thereon a program for writing a given image into recording means and reproducing and outputting said recorded image by means of display means, and capable of writing data other than said image in said recording means, to cause said program to be executed in an image processing apparatus, said program comprising:

a judging step of judging, during writing the image or the data other than the image into the recording means, if a power supply capacity of a power source becomes less than a predetermined first capacity; and

a control step of reducing the electric power to be supplied to said display means when a judging result is affirmative.

[Claim 14]

A recording medium according to claim 13, wherein said program predetermines a second capacity larger than the first capacity, and further comprises a warning judging step of judging if the power supply capacity of said power source becomes less than said second capacity, said warning judging step produces a warning when a judging result thereof is affirmative.

[Claim 15]

A recording medium according to claim 14, wherein

said warning judging step effects the warning onto display means different from said display means for displaying the image.

[Claim 16]

A recording medium according to any one of claims 13 to 15, wherein said program further comprises a power supply stopping step of stopping power supply to the entire apparatus upon completion of writing into said recording means when a judging result of said judging means in relation to the first capacity is affirmative.

[Claim 17]

A recording medium according to any one of claims 13 to 16, wherein the power source is a battery.

[Claim 18]

A recording medium according to any one of claims 13 to 17, wherein said recording means is a portable recording medium detachable from the apparatus main body.

[Detailed Description of the Invention]

[0001]

[Field of the Industrial Utilization]

The present invention relates to an image processing apparatus for photographing, recording, reproducing, and processing still and moving images, its method, and a recording medium.

[0002]

[Prior Art]

Conventionally, image processing apparatuses such

as electronic cameras and the like, which record/reproduce still and moving images using memory cards having solid state memory elements as recording media have already been commercially available, and electronic cameras with electronic viewfinders such as color liquid crystal panels and the like have also been commercially available.

[0003]

These electronic cameras can reproduce images recorded on a memory card, and a write to a memory card is frequently made during reproduction. For example, while reviewing the reproduced images, an image is erased, a print designation file is generated on a memory card, and so forth.

[0004]

[Problems to be Solved by the Invention]

In such conventional reproduction apparatus, when the power source voltage to the system drops during file access to a memory card, a write of an image is interrupted so as not to destroy the file system on the memory card.

In such case, since the last image written in the recording medium such as a memory card becomes incomplete due to a system problem, i.e., a drop of the power source voltage, the final state of images on the memory card is different from that the user intended.

[0005]

Therefor, it is an object of the present invention to provide an image processing apparatus and its method, and a storage medium, which is not affected by a drop of

the power source voltage.

[0006]

[Means for Solving the Problems]

In order to achieve the above object, according to claim 1 of the present invention, there is provided an image processing apparatus for writing a given image into recording means and reproducing and outputting the recorded image by means of display means, and capable of writing data other than the image in the recording means, comprising: judging means for judging, during writing the image or the data other than the image into the recording means, if a power supply capacity of a power source becomes less than a predetermined first capacity; and control means for reducing the electric power to be supplied to the display means when a judging result is affirmative.

[0007]

According to claim 2 of the present invention, in the image processing apparatus defined in the above claim 1, a second capacity larger than the first capacity is predetermined, the judging means judges if the power supply capacity of the power source becomes less than the second capacity, and a warning is produced when a judging result is affirmative.

[0008]

According to claim 3 of the present invention, in the image processing apparatus defined in the above claim 2, the warning means is display means different from the

display means for displaying the image.

[0009]

According to claim 4 of the present invention, in the image processing apparatus defined in any one of the above claims 1 to 3, the control means stops power supply to the entire apparatus upon completion of writing into the recording means in case that a judging result of the judging means in relation to the first capacity is affirmative.

[0010]

According to claim 5 of the present invention, in the image processing apparatus defined in any one of the above claims 1 to 4, the power source is a battery.

[0011]

According to claim 6 of the present invention, in the image processing apparatus defined in any one of the above claims 1 to 5, the recording means is a portable recording medium detachable from the apparatus main body.

[0012]

According to claim 7 of the present invention, there is provided an image processing method of writing a given image in recording means and reproducing and outputting the recorded image by means of display means, and capable of writing data other than the image in the recording means, comprising: a judging step of judging, during writing the image or the data other than the image into the recording means, if a power supply capacity of a power source becomes

less than a predetermined first capacity; and a control step of reducing the electric power to be supplied to the display means when a judging result is affirmative.

[0013]

According to claim 8 of the present invention, the image processing method defined in the above claim 7 further comprises a warning judging step of predetermining a second capacity larger than the first capacity, and of judging if the power supply capacity of the power source becomes less than the second capacity, wherein said warning judging step produces a warning when a judging result thereof is affirmative.

[0014]

According to claim 9 of the present invention, in the image processing method defined in the above claim 8, the warning judging step effects the warning onto display means different from the display means for displaying the image.

[0015]

According to claim 10 of the present invention, the image processing method defined in any one of the claims 7 to 9 further comprises a power supply stopping step of stopping power supply to the entire apparatus upon completion of writing into the recording means when a judging result of the judging means in relation to the first capacity is affirmative.

[0016]

According to claim 11 of the present invention, in the image processing method defined in any one of the claims 7 to 10, the power source is a battery.

[0017]

According to claim 12 of the present invention, in the image processing method defined in any one of the claims 7 to 11, the recording means is a portable recording medium detachable from the apparatus main body.

[0018]

According to claim 13 of the present invention, there is provided a recording medium recording thereon a program recorded therein for writing a given image into recording means and reproducing and outputting the recorded image by means of display means, and capable of writing data other than the image in the recording means, to cause the program to be executed in an image processing apparatus, wherein the program comprises: a judging step of judging, during writing the image or the data other than the image into the recording means, if a power supply capacity of a power source becomes less than a predetermined first capacity; and a control step of reducing the electric power to be supplied to the display means when a judging result is affirmative.

[0019]

According to claim 14 of the present invention, in the recording medium defined in claim 13, the program predetermines a second capacity larger than the first

capacity, and further comprises a warning judging step of judging if the power supply capacity of the power source becomes less than the second capacity, the warning judging step producing a warning when a judging result thereof is affirmative.

[0020]

According to claim 15 of the present invention, in the recording medium defined in claim 14, the warning judging step effects the warning onto display means different from the display means for displaying the image.

[0021]

According to claim 16 of the present invention, in the recording medium defined in any one of the claims 13 to 15, the program further comprises a power supply stopping step of stopping power supply to the entire apparatus upon completion of writing the recording means when a judging result of the judging means in relation to the first capacity is affirmative.

[0022]

According to claim 17 of the present invention, in the recording medium defined in any one of the claims 13 to 16, the power source is a battery.

[0023]

According to claim 18 of the present invention, in the recording medium defined in any one of the claims 13 to 17, the recording means is a portable recording medium detachable from the apparatus main body.



[0024]

[Detailed Description of the Preferred Embodiments]

The preferred embodiments of the present invention will be described hereinafter with reference to the accompanying drawings.

[0025]

Fig. 1 shows the circuit arrangement according to an embodiment of the present invention. Referring to Fig. 1, an image processing apparatus 100 comprises a photographing lens 10, and a shutter 12 with a stop function. An image pickup element 14 converts an optical image into an electrical signal, and an A/D converter 16 converts an analog signal output from the image pickup element 14 into a digital signal.

[0026]

A timing generation circuit 18 supplies clock signals and control signals to the image pickup element 14, the A/D converter 16, and a D/A converter 26, and is controlled by a memory control circuit 22 and system control circuit 50.

[0027]

An image processing circuit 20 performs predetermined pixel interpolation and color conversion for data supplied from the A/D converter 16 or the memory control circuit 22. The image processing circuit 20 makes predetermined computations using photographed image data to execute a TTL (Through The Lens) AF (auto focus) process, AE (auto exposure) process, and EF (flash pre-emission)

process in which the system control circuit 50 controls an exposure control means 40 and ranging control means 42 on the basis of the obtained computation results. Furthermore, the image processing circuit 20 makes predetermined computations using photographed image data, and executes a TTL AWB (auto white balance) process on the basis of the obtained computation results.

[0028]

The memory control circuit 22 controls the A/D converter 16, the timing generation circuit 18, the image processing circuit 20, an image display memory 24, the D/A converter 26, a memory 30, and a compression/expansion circuit 32.

[0029]

Data output from the A/D converter 16 is written in the image display memory 24 or memory 30 via the image processing circuit 20 and memory control circuit 22 or directly via the memory control circuit 22.

[0030]

The image display memory 24 is connected to the D/A converter 26 via the memory control circuit 22. An image display unit 28 comprises a TFT LCD or the like. Display image data written in the image display memory 24 is displayed by the image display unit 28 via the D/A converter 26. When photographed image data are displayed at photographing timings using the image display unit 28, an electronic viewfinder function can be implemented. The

image display unit 28 can arbitrarily turn on/off its display in response to an instruction from the system control circuit 50. When the display is turned off, the consumption power of the image processing apparatus 100 can be greatly reduced.

[0031]

Furthermore, the image display unit 28 is coupled to the image processing apparatus 100 main body via a rotatable hinge, and its various display functions such as the electronic viewfinder function, reproduction display function, and the like can be used while setting the image display unit 28 in desired direction and angle. Also, the image display unit 28 can be stored so that its display surface faces the image processing apparatus 100. In such case, an image display unit open/close detection means 106 can detect the storage state, and can stop the display operation of the image display unit 28.

[0032]

The memory 30 stores photographed still and moving images. The memory 30 has a storage capacity large enough to store a predetermined number of still images or a moving image for a predetermined period of time. With this arrangement, even in a serial or panoramic photographing mode for continuously photographing a plurality of still images, many images can be written in the memory 30 at high speed. Also, the memory 30 can be used as a work area of the system control circuit 50.

[0033]

The compression/expansion circuit 32 compresses/ expands image data by adaptive discrete cosine transformation (ADCT) or the like. The compression/ expansion circuit 32 reads an image stored in the memory 30, compresses or expands it, and writes the processed data in the memory 30. The exposure control means 40 controls the shutter 12 with the stop function. The exposure control means 40 also has a flash light control function in cooperation with an electronic flash unit 400.

[0034]

The ranging control means 42 controls focusing of the photographing lens 10. The exposure control means 40 and ranging control means 42 are controlled using TTL, and the system control circuit 50 controls the exposure control means 40 and ranging control means 42 on the basis of computation results of photographed image data by the image processing circuit 20.

[0035]

A zoom control means 44 controls zooming of the photographing lens 10, and a barrier control means 46 controls the operation of a protection means 102 serving as a barrier.

A connector 48 is also called an accessory shoe, and also comprises electrical contacts and mechanical fixing means for the electronic flash unit 400.

[0036]

The system control circuit 50 controls the overall image processing apparatus 100, and a memory 52 stores

constants, variables, programs, and the like for operations of the system control circuit 50, and is corresponding to a recording medium with a program according to the present invention recorded therein.

[0037]

An indication unit 54 includes a liquid crystal display device, loudspeaker, and the like, and indicates operation states, messages, and the like using characters, images, voices, and the like in accordance with execution of a program by the system control circuit 50. The indication unit 54 is placed at one or a plurality of positions around the operation unit of the image processing apparatus 100, that are easy to see, and is comprised of a combination of an LCD, LEDs, tone generation element, and the like.

Some functions of the indication unit 54 are placed within an optical viewfinder 104.

[0038]

Of the indication contents of the indication unit 54, those indicated on an LCD or the like include, e.g., a single/serial photographing indication, self-timer indication, compression ratio indication, recording pixel count indication, recording image count indication, remaining photographable image count indication, shutter speed indication, aperture value indication, exposure correction indication, flash indication, red-eye suppression indication, macro-photographing indication, buzzer setting indication, timepiece battery remaining

capacity indication, error indication, information indication using numerals of a plurality of digits, loading/unloading state indication of recording media 200 and 210, communication I/F operation indication, date/time indication, and the like.

[0039]

Of the indication contents of the indication unit 54, those indicated within the optical viewfinder 104 include, e.g., an in-focus indication, camera shake alert indication, flash charging indication, shutter speed indication, aperture value indication, exposure correction indication, and the like.

[0040]

An electrically rewritable nonvolatile memory 56 uses, e.g., an EEPROM.

[0041]

Operation means 60, 62, 64, 66, 68, and 70 are used to input various operation instructions of the system control circuit 50. These operation means are constructed by one or a plurality of combinations of a switch, a dial, a touch panel, a pointer using line of sight detection, a voice recognition device, and the like.

[0042]

An example of these operation means will be explained below.

[0043]

A mode dial switch 60 can switch various function

modes such as power OFF, an automatic photographing mode, photographing mode, panoramic photographing mode, reproduction mode, multi-frame reproduction/erase mode, PC connection mode, and the like.

[0044]

A shutter switch SW1 62 is turned on in the middle of operation of a shutter button (not shown), and instructs start of an AF (auto focus) process, AE (auto exposure) process, AWB (auto white balance) process, EF (flash pre-emission) process, and the like.

[0045]

A shutter switch SW2 64 is turned on upon completion of operation of the shutter button (not shown), and instructs start of a series of processes including an exposure process for writing a signal read out from the image sensing element 14 as image data in the memory 30 via the A/D converter 16 and memory control circuit 22, a development process using computation results in the image processing circuit 20 and memory control circuit 22, and a recording process for reading out image data from the memory 30, compressing the readout data by the compression/expansion circuit 32, and writing the compressed image data in the recording medium 200 or 210.

[0046]

An image display ON/OFF switch 66 can set an ON/OFF state of the image display unit 28. With this function, when current supply to the image display unit 28 comprising

the TFT LCD or the like is cut off upon photographing using the optical viewfinder 104, power savings can be attained.

[0047]

A single/serial photographing switch 68 can set a single photographing mode in which an image for one frame is photographed upon depression of the shutter switch SW2, and a standby state is set, and a serial photographing mode in which photographing is continuously done while the shutter switch SW2 is held down.

[0048]

An operation unit 70 is comprised of various buttons, touchpanel, and the like, which include the following buttons, i.e., a menu button, set button, macro button, multi-frame reproduction new page button, flash setting button, single/serial photographing/self-timer select button, menu move + (plus) button, menu move - (minus) button, reproduced image move + (plus) button, reproduced image move - (minus) button, photographed image quality select button, exposure correct button, date/time setting button, select/switch button for selecting and switching various functions upon executing photographing and reproduction in, e.g., the panorama mode, button for starting audio recording, determine/execute button for determining and executing various functions upon executing photographing and reproduction in, e.g., the panorama mode, image display ON/OFF switch for turning ON/OFF the image display unit 28, quick review ON/OFF switch for setting a quick review



function of automatically reproducing photographed image data immediately after photographing, compression mode switch serving as a switch for selecting a JPEG compression ratio or selecting a CCDRAW mode that directly converts a signal output from the image pickup element into digital data and records the digital data in the recording medium, reproduction mode switch which can set various function modes such as a reproduction mode, multi-frame reproduction/erase mode, PC connection mode, and the like, reproduction switch for instructing to start a reproduction process for reading out an image photographed in the photographing mode from the memory 30 or the recording medium 200 or 210, and displaying the readout image on the image display unit 28, drive button for changing an active drive, reproduction display select button for selecting single- or multi-image display upon reproduction, information display button for displaying additional information of a recorded image, and the like.

[0049]

A power source control means 80 is comprised of a battery detection circuit, DC-DC converter, switch circuit for switching a block to be energized, and the like. The power source control means 80 detects the presence/absence, type, and remaining battery amount of a battery attached, controls the DC-DC converter on the basis of such detection results and an instruction from the system control circuit 50, and supplies a required voltage to the respective units

including the recording medium 200 for a required period of time. The power source control means 80 can shut down the power source in response to an instruction from the system control circuit 50.

[0050]

A power source means 86 is connected to the power source control means 80 via connectors 82 and 84, and includes a primary battery such as an alkali battery, lithium battery, or the like, a secondary battery such as an NiCd battery, NiMH battery, Li Battery, or the like, an AC adapter, and the like.

[0051]

The recording media 200 and 210 such as a memory card, hard disk, and the like are connected to the image processing apparatus via interfaces 90 and 94 and connectors 92 and 96. A recording medium attachment/detachment detection means 98 detects whether or not the recording medium 200 or 210 is attached to the connector 92 and/or the connector 96.

[0052]

Note that this embodiment has two sets of interfaces and connectors that receive the recording media 200. Of course, the number of sets of interfaces and connectors that receive the recording media 200 is not particularly limited. Also, combinations of interfaces and connectors of different standards may be used. As the interface and connector, those complying with the standards of a PCMCIA

card, CF (compact flash) card, and the like may be used.  
[0053]

When the interfaces 90 and 94, and connectors 92 and 96 use those complying with the standards of a PCMCIA card, CF (compact flash) card, and the like, various communication cards such as a LAN card, modem card, USB card, IEEE1394 card, P1284 card, SCSI card, PHS, and the like are connected thereto, image data and associated management information can be transferred between the image processing apparatus 100 and another computer or its peripheral devices such as a printer and the like.  
[0054]

The protection means 102 serves as a barrier which covers an image pickup unit including the lens 10 of the image processing apparatus 100 to protect it from contamination and damages. The optical viewfinder 104 allows photographing using the optical viewfinder alone without using the electronic viewfinder function implemented by the image display unit 28. In the optical viewfinder 104, some functions of the indication unit 54, e.g., an in-focus indication, camera shake alert indication, flash charging indication, shutter speed indication, aperture value indication, exposure correction indication, and the like are placed.  
[0055]

The image display unit open/close detection means 106 can detect whether or not the image display unit 28

is stored with its display surface facing the image processing apparatus 100. If the means 106 detects such storage state, it can stop the display operation of the image display unit 28 to inhibit unnecessary power consumption.

[0056]

A communication means 110 has various communication functions such as RS232C, USB, IEEE1394, P1284, SCSI, modem, LAN, radio communication, and the like. A connector or antenna 112 (in case of a radio communication) connects the image processing apparatus 100 to another device via the communication means 110.

[0057]

The recording medium 200 uses a memory card, hard disk, or the like. The recording medium 200 comprises a recording unit 202 comprised of a semiconductor memory, magnetic disk, or the like, an interface (I/O) 204 with the image processing apparatus 100, and a connector 206 for connecting the image processing apparatus 100. The recording medium 210 also uses a memory card, hard disk, or the like. The recording medium 210 comprises a recording unit 212 comprised of a semiconductor memory, magnetic disk, or the like, an interface 214 with the image processing apparatus 100, and a connector 216 for connecting the image processing apparatus 100.

[0058]

The electronic flash unit 400 has a connector 402 to be connected to the accessory shoe of the image processing

apparatus 100. The unit 400 includes an electronic flash 404 which has a function of projecting AF auxiliary light and the flash light control function.

[0059]

Power source control done in such system arrangement will be explained below with reference to Fig. 2. A program, the contents of which are shown in Fig. 2, is read out from the memory 52 and is executed by the system control circuit 50, when the system control circuit 50 writes data in the recording medium 200.

[0060]

The system control circuit 50 writes data in the recording medium 200/210, when the photographed still or moving image is recorded (first), when various data are written to generate a file that designates the print contents of recorded images on the recording medium 200/210 (second), when a system process for writing the identification name of a file or image recorded on the recording medium is done (third), and the like. Power source control will be explained below taking as an example a case wherein a file for designating the print contents is generated.

[0061]

The power source control means 80 detects and monitors the supplied voltage. When the system control circuit 50 starts access to the recording medium 200 in accordance with an operation instruction from the operation unit, the program shown in Fig. 2 is started (S201). The

system control circuit 50 sets a detected power source voltage value  $V$  from the power source control means 80 (S202), and compares it with a voltage warning level  $L1$  (S203).

[0062]

If the power source voltage value  $V$  is higher than the warning level  $L1$ , an access process to the recording medium 200 is executed (S207), thus ending the processing sequence.

[0063]

On the other hand, if  $V < L1$ , the system control circuit 50 compares the power source voltage value  $V$  with an inoperative level  $L2$  (S204). If the power source voltage value  $V$  is higher than the inoperative level  $L2$  ( $L1 > L2$ ), a battery warning display is made (S205). Subsequently, the system control circuit 50 executes an access process (S207), and ends the processing sequence shown in Fig. 2.

On the other hand, if  $V < L2$ , since the operation cannot be continued, the system control circuit 50 sends a backlight OFF command of the image display unit 28 to the power source control means 80 to turn off a backlight (S206). Then, the system control circuit 50 proceeds with the access process to the recording medium 200, and ends the processing sequence shown in Fig. 2 (S207 → S208). Finally, upon completion of the processing sequence shown in Fig. 2 (S208), the system is shut down, and the other indication unit 54 displays a message "Lb" indicating an inoperative state resulting from the power source voltage drop, thus informing the user

of the current status. The values L1 and L2 are determined in advance, and are defined in the program.

[0064]

Note that the power source control of the present invention is associated with a file access of the reproduction processing apparatus, and more particularly, a data write, and is not limited to generation of a print designation file. For example, when the current voltage level cannot proceed with a process during erasure of all images in the recording medium 200 or 201, the process can be continued by turning off the backlight of the image display unit 28.

At this time, an LED or the like may be used to inform the user that the process is underway. Likewise, an initialization process of the recording medium can be implemented using the above embodiment.

[0065]

In either case, when a process instructed at the operation unit or a specific control process is executed, the process shown in Fig. 2 is executed. In this case, the access process shown in Fig. 2 corresponds to the process instructed at the operation unit or the control process instructed from another program that the system control circuit 50 is to execute.

[0066]

The aforementioned print designation process will be explained below using Figs. 3 to 6. Fig. 3 is a block diagram showing the processing contents of print designation.

Fig. 4 shows an image select window for designating an image to be printed. Fig. 5 shows the contents of a program for implementing the detection/analysis flow of a print designation file stored in the recording medium 200 or 210.

[0067]

When the user sets the mode dial 60 at the position of "PLAY", the reproduction mode is started, and the system control circuit 50 analyzes a print designation file in the recording medium 200 or 210.

[0068]

In order to check the presence/absence of a print designation file, the system control circuit 50 searches a root directory of the recording medium 200 or 210 for a directory named MISC (the directory name of a print designation file) (S610 in Fig. 5).

[0069]

If MISC is not found, it is determined that no print designation file is present, and the analysis process ends (S609). The system control circuit 50 then checks if MISC is a file (S602). If MISC is not a directory but a file, a print designation item in a reproduction menu M300 in Fig. 3 is grayed out (S606), and the processing sequence shown in Fig. 5 ends (S609).

[0070]

If MISC is a directory (NO in step S602), it is determined (checked) if a file AUTPRINT.MRK is present in the MISC directory (S611). If no such file is present,



the processing sequence shown in Fig. 5 ends (S609).

[0071]

If AUTPRINT.MRK is found, the system control circuit 50 sets an EXIST flag indicating the presence of a mark file (S612), and checks the attribute of the AUTPRINT.MRK file (S603). If AUTPRINT.MRK has a read-only attribute (i.e., a write inhibition attribute), the print designation item in a reproduction menu M300 is grayed out, and the processing sequence shown in Fig. 5 ends (S603 → S606 → S609).

[0072]

If the attribute enables write, i.e., data can be written in AUTPRINT.MRK, the system control circuit 50 checks the remaining amount of the storage capacity of the recording medium 200 or 210 (S604). If the remaining amount of the recording medium 200 or 210 is not large enough to store one print designation information, the system control circuit 50 grays out the print designation item in the reproduction menu M300, and ends processing (S604 → S606 → S609).

[0073]

If the recording medium 200 or 210 has a sufficiently large remaining amount, the AUTPRINT.MRK file is analyzed (S605). In file analysis in step S605, it is checked if the file has a syntax that the apparatus of this embodiment can generate, and if the designated image to be printed is stored in the recording medium 200 or 210. If both the

conditions are satisfied, it is determined that the file can be generatable by the apparatus of this embodiment (YES in step S607).

[0074]

The file analysis result is set in a print type variable, image information variable, designated print count, and total standard print count variable. Of these variables, the print type variable value and image information variable value are set on the nonvolatile memory 56. If it is determined in step S607 that the file is not generatable by the apparatus of this embodiment, a warning flag to be displayed in a print designation menu M301 is set (S607 → S608), and the processing sequence shown in Fig. 5 ends (S609).

[0075]

If it is determined that the file is generatable by the apparatus of this embodiment, the processing sequence shown in Fig. 5 ends (S609) (S607 → S609). Upon completion of the aforementioned analysis process, the system control circuit 50 reproduces an image stored in the recording medium 200 or 210.

[0076]

When the user has pressed a menu button of the operation unit 70 during image reproduction, the reproduction menu M300 shown in Fig. 3 is displayed on the image display unit 28. On the reproduction menu, the item position is moved by +/- buttons on the operation unit 70,

and a given item is determined by a SET button.

[0077]

When the print designation item in the reproduction menu is displayed, if the EXIST flag is set, the system control circuit 50 displays a check icon beside the item "print designation" on the basis of the file analysis result to inform the user of the presence of the print designation file.

[0078]

When a given item is set to be grayed out, that item is grayed out so as not to be selectable from the menu.

Furthermore, when the warning flag is set in the process in step S608, a "!" icon which means that information is rewritten is displayed. Upon depression the SET button on the print designation item, the print designation menu M301 (see Fig. 3) is displayed.

[0079]

Upon displaying the print designation menu M301, the system control circuit 50 acquires the print type variable and image information variable from the nonvolatile memory 56, and sets them in print type M310 and image information M340 of the menu. Also, the circuit 50 refers to the print designation count and total standard print count variable and displays them beside an item "image designation" M320.

[0080]

In the print designation menu M301, items "print type" M310, "image designation" M320, "releasing of

designation" M330, and "image information" M340 are selectable items. Upon depression of the SET button on the item "print type" M310, items "standard" M311, "index" M312, and "both" M313 are selectable, and one of these items is selected by the SET button.

[0081]

When the user has pressed the MENU button at that time, selection is canceled, and the print designation menu M301 is displayed again. Note that the item "both" M313 means that print designation is made by both "standard" and "index". This setting value is set in the nonvolatile memory 56.

[0082]

When the user selects "image designation" M320, items "selection image" M321 and "all images" M322 are selectable. When the item "selection image" M322 is selected, the marking mode shown in Fig. 4 is started. When the user selects the item "all images" M322, all images recorded in the recording medium 200 or 210 undergo print designation.

[0083]

When the number of images is limited by limitations on the print designation syntax, the system control circuit 50 designates the number of images including the latest image, and displays a "!" icon beside the print count indication. When all images in the recording medium 200 or 210 cannot undergo print designation due to the limited CF remaining amount, the system control circuit 50 displays

the "!" icon beside the count indication, and also displays a message "CF card is full" on the lower portion of the window, thus informing the user of the reason.

[0084]

The operation in the marking mode will be explained below with reference to Fig. 4. The following operations are done in the marking mode.

[0085]

(1) An image is moved by [+] or [-].

[0086]

(2) An image is marked by [SET]. The number of images = 1.

[0087]

(3) The mark of the already set image is canceled by [SET].

[0088]

(4) The print count is displayed beneath the check mark.

[0089]

(5) The number of images is incremented by [SET] + [+]. The maximum number of images = 29. When the number of images is incremented at "29", it returns to "0".

[0090]

(6) When the number of images set has reached 10, the numerical value is underlined. The underline is displayed in units of 10 images.

[0091]

(7) The number of images is decremented by [SET] + [-]. The set value is canceled when the number of images is set at "0". When the number of images is decremented at "0", it shifts to "29".

[0092]

(8) When the number of designated images has exceeded the maximum value, [SET] designation is grayed out to disable marking.

[0093]

(9) The total standard count (right) is displayed on the upper right position of the window.

[0094]

(10) When the print designation file describes 29 or more images, "!" is displayed. Note that the corresponding file is handled as the file to be changed.

(That is, the mark is erased upon depression of [SET], and after that, setups are allowed.)

(11) When a main image is other than JPEG, [SET] designation is grayed out to disable setups.

[0095]

(12) Upon designating an index print, the number of images that can be set is only "1", and no numerical value is displayed. (That is, only a check mark is displayed.)

(13) Upon depression of the MENU button, the print designation menu is displayed again.

[0096]

When the item "releasing of designation" M330 is selected, a confirmation dialog M331 for releasing all the currently set print designations is displayed. If "releasing of designation" is canceled, a releasing process is canceled, and the print designation menu is displayed again. If execution is selected, all print designations are released, and when a print designation file is present, that file is erased.

[0097]

The item "image information" M340 in the print designation menu M301 is used to set a character print in the print process. An item "no" M341 is used to print selected one of items "date" M342 and "file number" M343 together with an image without designating a character print. An item "both" M344 is used to print both the date and file number.

[0098]

Print designation information set in accordance with the aforementioned designation method is saved in the recording medium 200/210 in the file format having contents shown in Fig. 6. Referring to Fig. 6, the entire print designation file is indicated by S700. The print designation file S700 is composed of a header section 701, and job sections S702, S703, S704, and S705. A tag S720 indicating the header section is described at the head position.

[0099]

In the next line, information S710 indicates the

version of print designation syntax. Subsequently, a model name S711 that makes file description is described. Current time information S712 is obtained from the internal timer of the system control circuit 50. The contents described in the header section S701 have been explained.

[0100]

A print designation description (called a job section or standard job) S702 is described after the header section S701. In the example shown in Fig. 6, an image to be printed is selected in the print designation process, and standard print is designated as a print type.

[0101]

A tag S721 indicates the job section. S713 is a value indicating the print order. S714 indicates a print type designated in M310 in Fig. 3. S715 indicates the number of images to be printed when the number of images is designated in the aforementioned marking mode. S716 indicates the format of the image to be printed. S717 indicates the file path (directory) of the image to be printed.

[0102]

S718 indicates designation contents (file number print) of image information print according to designation of M341 in Fig. 3. S719 indicates designation contents of date print. The aforementioned standard jobs are described in correspondence with the number of images designated in the print designation process.

[0103]



When "index print" and "both" are selected in M310 in Fig. 3, the index job S705 is described. The index job S705 also starts from a tag S730 that declares the job.

S731 is a tag indicating the print order. S732 is a tag indicating a print type. S733 indicates the file format of the image to be printed.

[0104]

S735 indicates print setups, which describe the file path of an image designated in the designation process, and setup information based on designations in S734 and M341 in Fig. 3. One of these pieces of information is described as S735 when only one image information is allowed to be printed or "both" is selected in M341 in Fig. 3 upon index print.

[0105]

In this embodiment, the file number is described as an example. When there are a plurality of images designated by indices, if the next image format is different from that of the immediately preceding image, a job is described from S733; if the next image has the same format as that of the immediately preceding image, a job is described from S734. In this manner, the system control circuit 50 describes index jobs in correspondence with the number of images designated in the print designation file in the recording medium 200/210, thus ending generation of the index job S705.

[0106]

The file of the print designation information set according to the aforementioned designation method is updated at the following timings:

[0107]

(1) When the MENU key has been pressed in the print designation menu. In this case, a message "processing in progress" and progress bar are displayed on the lowermost portion of the menu, and the reproduction menu is displayed again upon completion of the processing.

[0108]

(2) When movement is instructed by a dial. At this time, the message "processing in progress" and progress bar are displayed as in (1), and operation at the dial position is started upon completion of the processing.

[0109]

(3) When the cover is opened. At this time, the message "processing in progress" and progress bar are displayed as in (1) and (2), and a warning sound is produced by a buzzer.

[0110]

(4) When the system automatically shuts itself down. The message "processing in progress" and progress bar are displayed as in (1), and the system is shut down after updating.

[0111]

(5) When the designated image to be printed is erased. In such case, RevisionID in the print designation

file is evaluated, and if it is different from an ID generated by the camera, the file is not edited. The positions to be edited are the corresponding lines in an [HDR] section, a standard job section including the erased image, and an index job.

[0112]

(6) When "Lb" is displayed. At this time, the LCD backlight is turned off, and a warning sound is produced using a buzzer. After that, the file is updated, and the system is shut down.

[0113]

In any case, access to the disk is informed by flickering an LED during file updating.

[0114]

As can be easily understood from the above description, according to this embodiment, when any power source voltage drop is detected during access to the file and the processing cannot be proceeded, the power source of the image display unit is turned off (shut down) to allow successful processes.

[0115]

The present invention also includes a case wherein power consumption of the display unit is reduced to successfully attain processes in place of turning off the power source. For example, the display luminance or display area of the display unit may be reduced. Also, in order to detect the power supply performance, a current may be

detected or the supply performance may be estimated from the use history or the like in place of detecting the power source voltage.

[0116]

In addition to the above embodiment, the following embodiment is available.

[0117]

1) In the above embodiment, the image processing apparatus such as a digital camera has been explained. Also, the present invention can be applied to various battery-driven information processing apparatuses that handle images.

[0118]

[Effect of the Invention]

As described above, according to claims 1, 7 and 13 of the present invention, when the voltage supplied from the power source drops abnormally, electric power to be supplied to the display means is reduced to relax an abnormal drop of the power source voltage, thus completing write access of data to the recording means. In this manner, the generation probability of data write errors can be greatly reduced.

[0119]

Also, according to claims 2, 3, 8, 9, 14 and 15 of the present invention, by using a display means different from that for reproducing an image, e.g., an LED lamp or a display with small power consumption, a user can be informed

of a voltage abnormal drop.

[0120]

Also, according to claims 4, 10 and 16 of the present invention, upon completion of data write, the power supply to the entire apparatus is cut off to prevent adverse influences which may be caused by a voltage drop.

[0121]

Also, according to claims 5, 11 and 17 of the present invention, the degree of battery voltage drop can be relaxed, and the battery itself can be protected.

[0122]

Also, according to claims 6, 12 and 18 of the present invention, not only data to be written but also the recording medium itself can be protected.

[Brief Description of the Drawings]

[Figure 1]

Block diagrams showing the circuit construction in an embodiment of the present invention.

[Figure 2]

A flowchart showing processing contents for a power source control in the embodiment of the present invention.

[Figure 3]

An illustration showing display contents relating to a print destination.

[Figure 4]

An illustration showing a portion of an image selecting screen.

[Figure 5]

A flowchart showing part of a preparing process of print destination file in the embodiment of the present invention.

[Figure 6]

An illustration showing an example of a print destination file.

[Description of Reference Numerals or Symbols]

- 10 ... photographing lens
- 12 ... shutter
- 14 ... image pickup element
- 16 ... A/D converter
- 18 ... timing generation circuit
- 20 ... image processing circuit
- 22 ... memory control circuit
- 24 ... image display memory
- 26 ... D/A converter
- 28 ... image display unit
- 30 ... memory
- 32 ... image compression/expansion circuit
- 40 ... exposure control means
- 42 ... ranging control means
- 44 ... zoom control means
- 46 ... barrier control means
- 48 ... connector (accessory shoe)
- 50 ... system control circuit
- 52 ... memory

- 54 ... indication unit
- 56 ... nonvolatile memory
- 60 ... mode dial switch
- 62 ... shutter switch SW1
- 64 ... shutter switch SW2
- 66 ... image display ON/OFF switch
- 68 ... single/serial photographing switch
- 70 ... operation switch
- 80 ... power source control means
- 82 ... connector
- 84 ... connector
- 86 ... power source means
- 90 ... interface
- 92 ... connector
- 94 ... interface
- 96 ... connector
- 98 ... recording medium attachment/detachment  
detection means
- 100 ... image processing apparatus
- 102 ... protection means
- 104 ... optical viewfinder
- 106 ... image display unit open/close detection means
- 110 ... communication means
- 112 ... connector (or antenna)
- 200 ... recording medium
- 202 ... recording unit
- 204 ... interface

206 ... connector  
210 ... recording medium  
212 ... recording unit  
214 ... interface  
216 ... connector  
400 ... electric flash unit  
402 ... connector  
404 ... flash



[Name of the Document]                      Abstract

[Abstract]

[Object]

                An object of the present invention is to reduce write errors of data to be written resulting from a power source voltage drop.

[Means for Achieving the Object]

                A system control circuit (50) monitors the power source voltage when data write access to a recording medium (200) occurs, and cuts off power supply to an image display unit (28) when the power source voltage becomes less than a predetermined value L2.

[Elected Drawing]

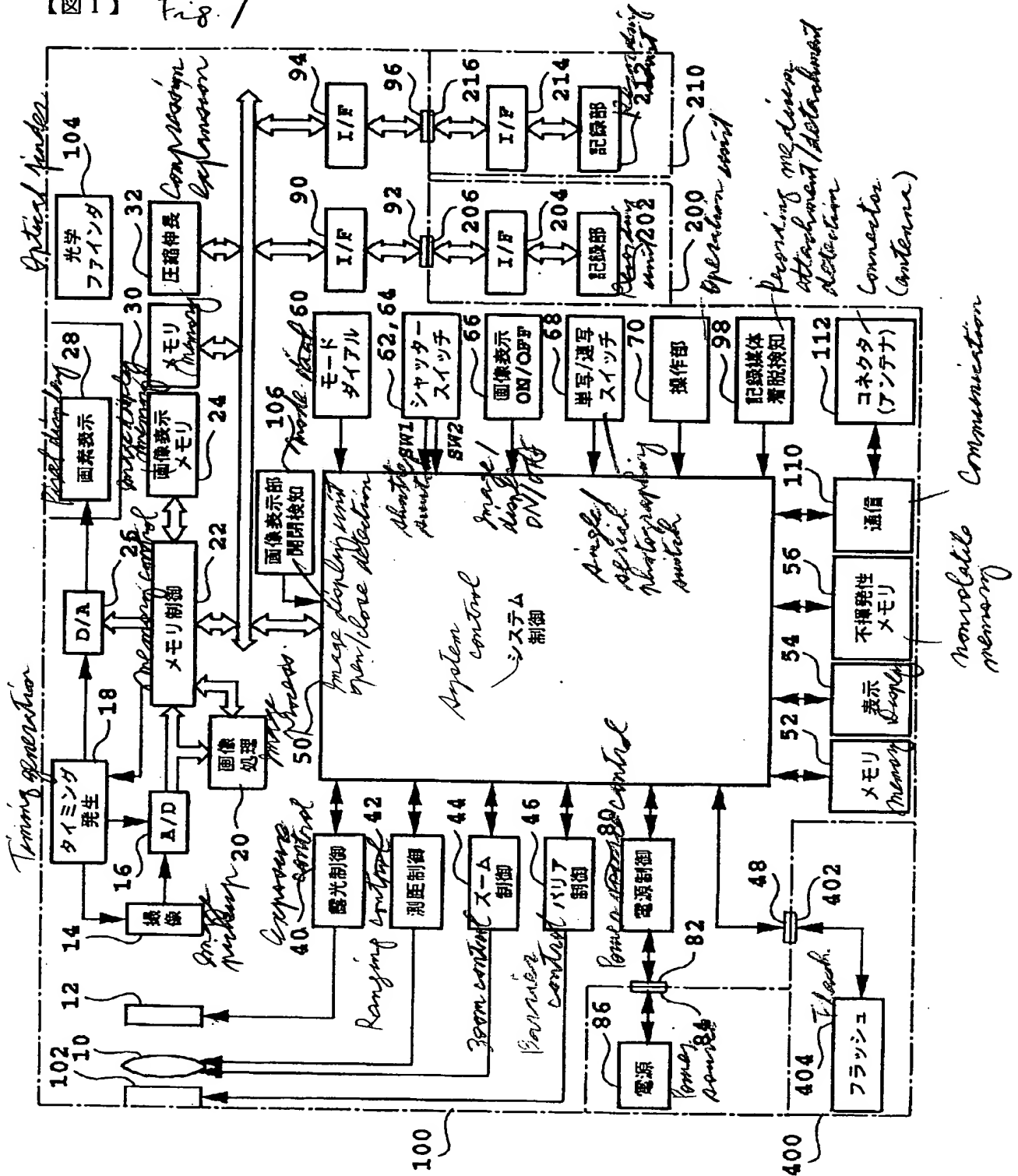
                Figure 1

【書類名】

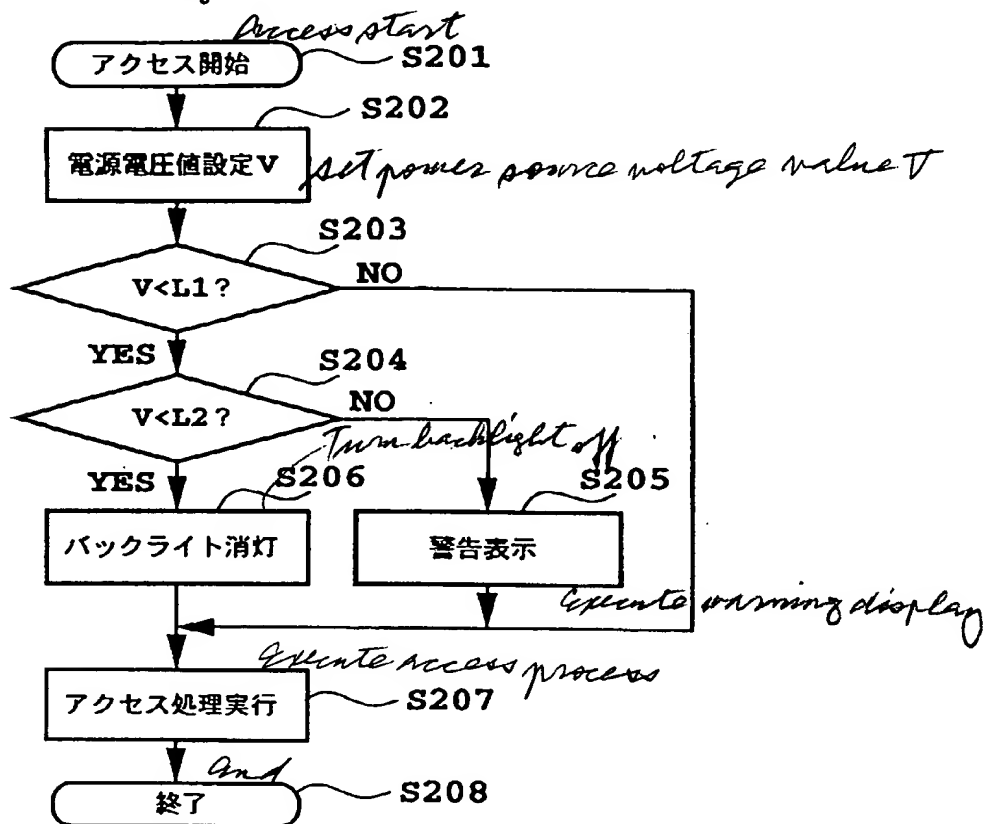
図面

[Name of the Document] Drawings

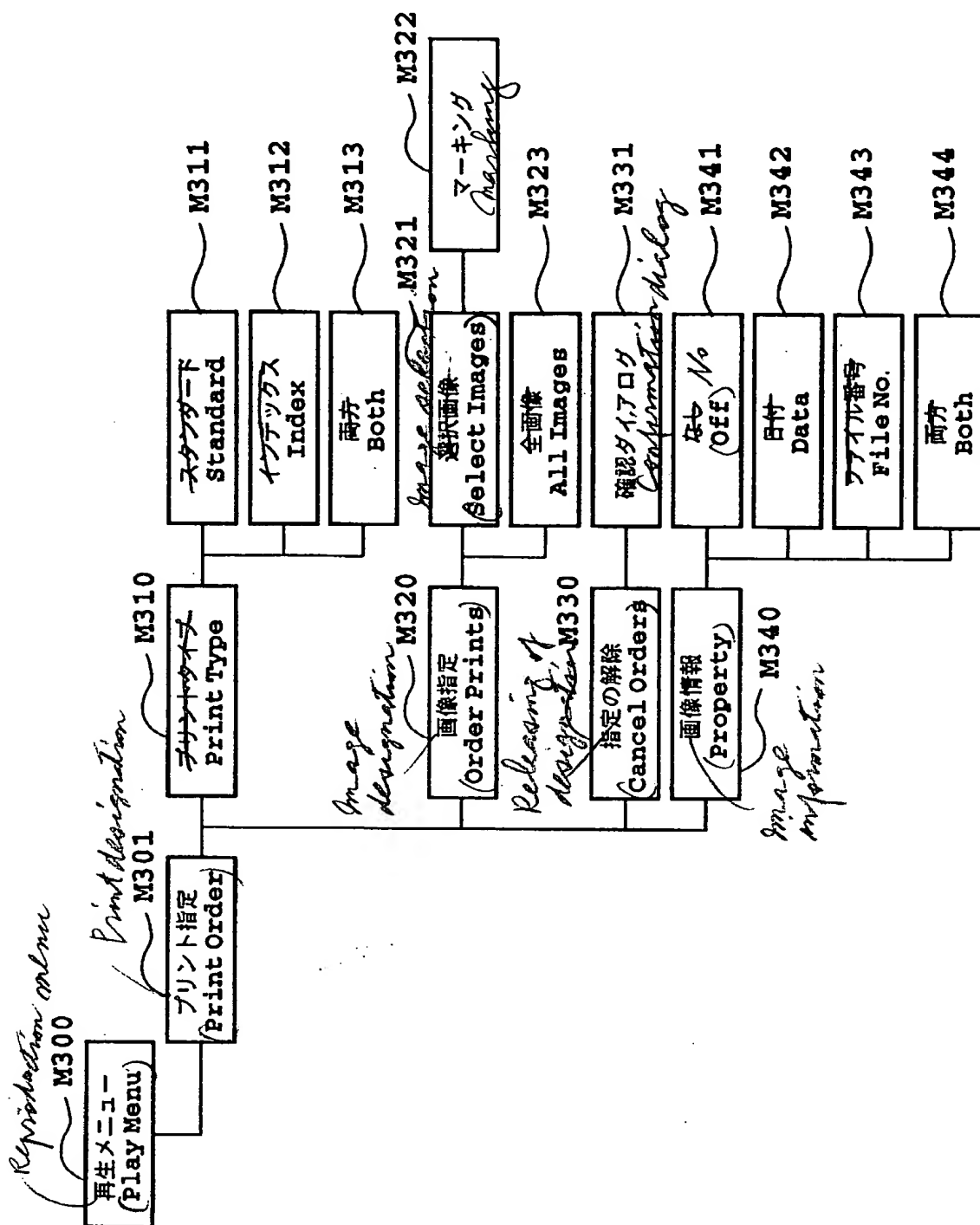
【図1】 Fig. 1



【図2】 Fig. 2



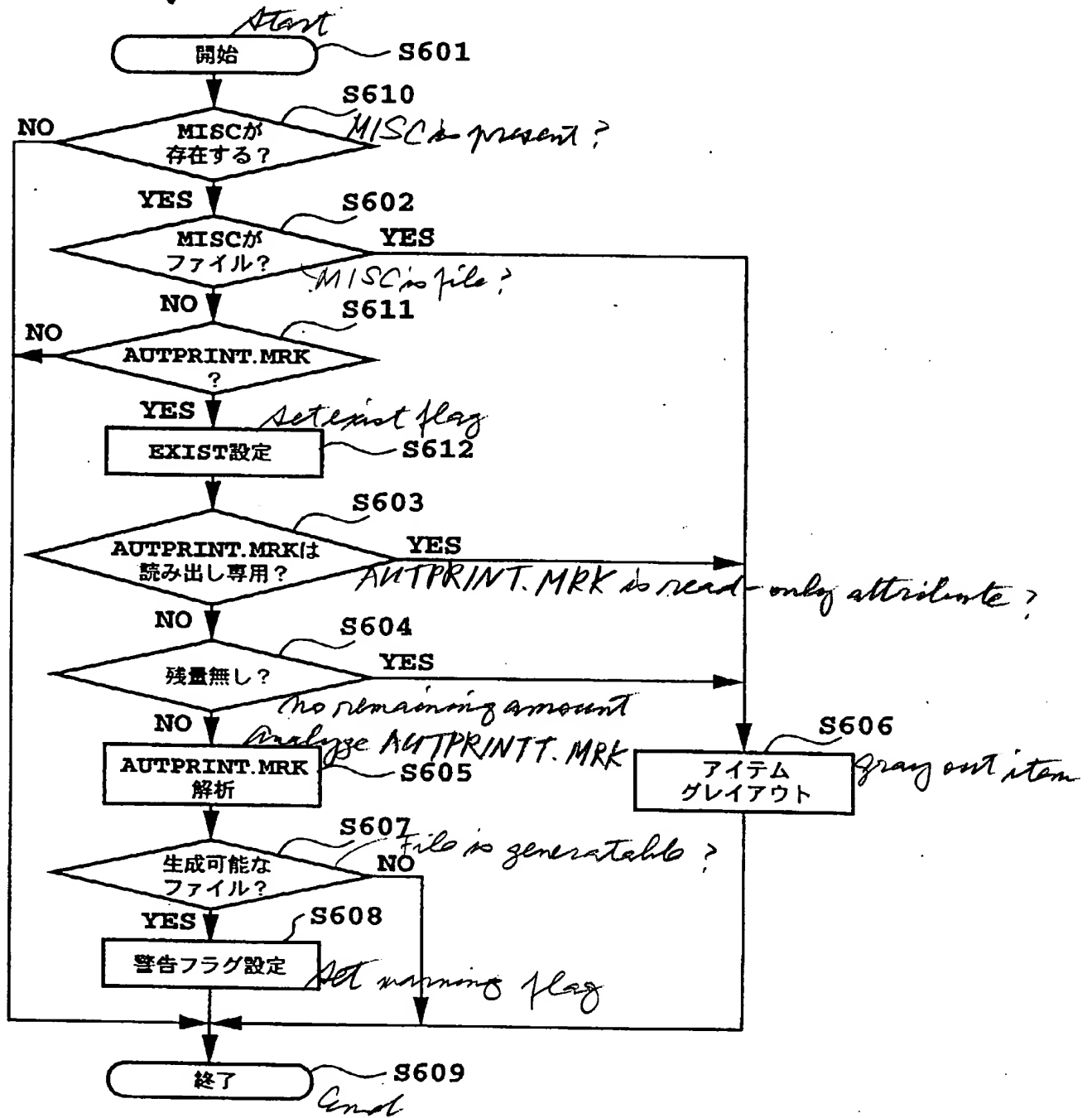
【図3】 Fig. 3



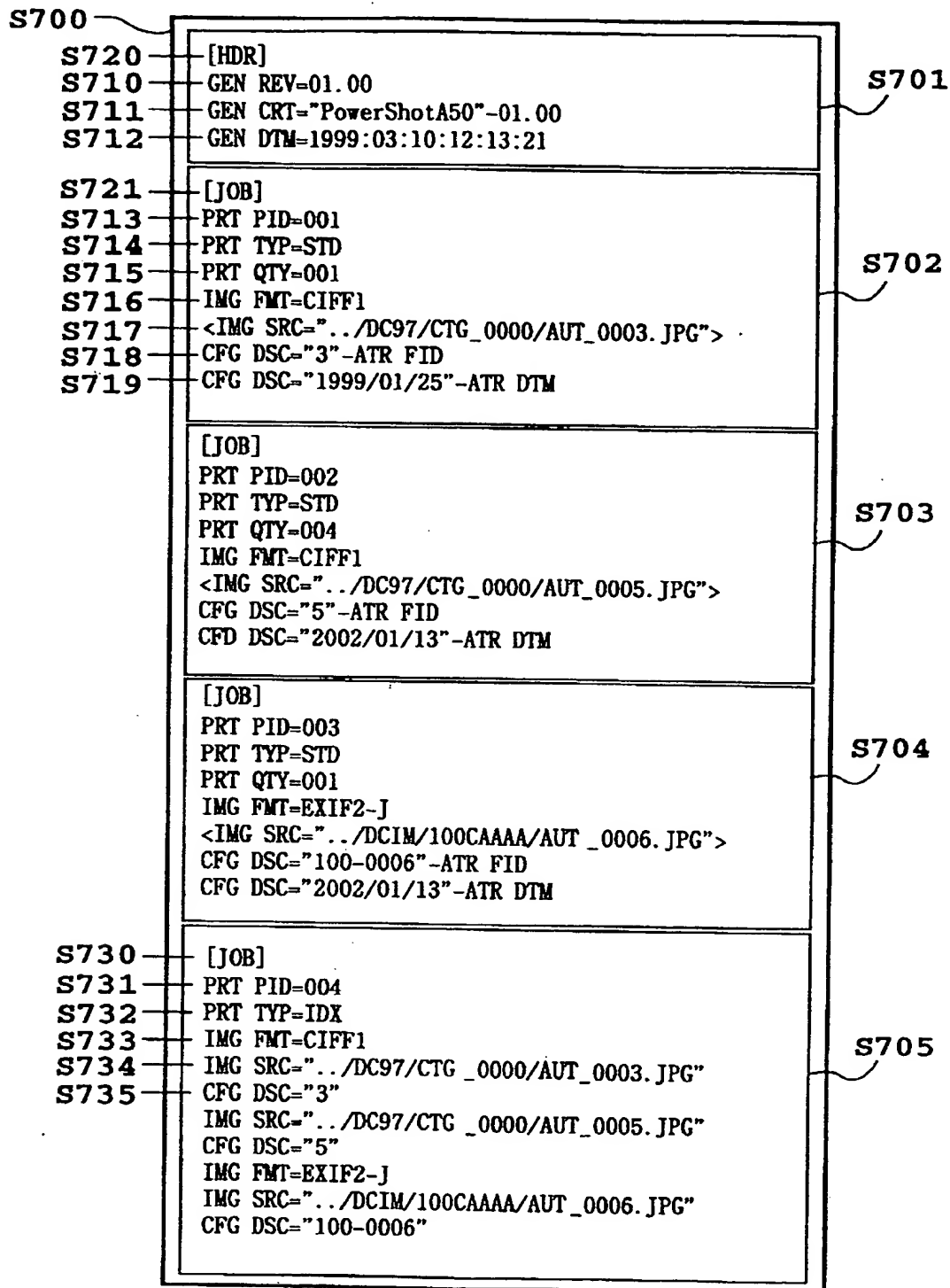
【图 4】 Fig. 4

Figure 1: Example of the image designation screen. The screen displays a grid of image selection boxes. The top row contains three boxes: the first is empty, the second contains a checkmark and the number '8', and the third is empty. The bottom row contains three boxes: the first is empty, the second is empty, and the third contains a checkmark and the number '1'. To the right of the grid is a '3D' icon. At the bottom, there is a '101-0102' label, a 'SET' button, and a 'Designation' label.

【図5】 Fig.5



【図6】 Fig. 6



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